Space Weather Forecast

Issued on Monday, 23 September 2024 at 13:07 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of G1/Minor Geomagnetic Storm intervals, mainly day 3 (25 Sep) due to arrival of fast solar winds and a possible glancing CME. Chance of Moderate flares (R1-R2 Blackouts).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Moderate with one Moderate class flare observed, peaking at 22/2139 UTC. This was from the eruption of a "filament" on the southeast disc. This is a line of material (plasma) that collects just above the sun's surface and can be the source of flares and coronal mass ejections (CMEs) if they are disrupted. This filament was located between two small and relatively simple sunspots, including a recently emerged one. Otherwise the main development out of the seven sunspot regions on the disc was with a small spot on the northwest disc. This saw the formation of a small mixed polarity "delta" spot within its intermediate spots, but also the decay of its leader and trailer spots. The larger, mature region in the south-centre disc is the next most complex, with a number of small developing and decaying spots surrounding its main spot. The other regions are smaller and simpler, although there is some evidence of a new region soon to move onto the southeast limb.

The filament eruption that produced the Moderate-flare produced a partial halo CME (coronal mass ejection), which has been observed in imagery. This is directed primarily to the south and east, away from Earth, however, analysis results suggests a possible glancing blow on day 3 (25 Sep). If this occurs, it would coincide with the arrival of a fast wind from a coronal hole, located near centre-disc. However, this is low confidence.

No other Earth-directed CMEs were observed.

Solar Wind / Geomagnetic Activity: Slow wind conditions persisted. Solar wind speeds declined from slightly elevated levels, with a peak of 440km/s, to be at background levels, near 350km/s. Interplanetary Magnetic Field was weak throughout, with its north-south component also remaining weak, and favours a positive (northward) direction. Geomagnetic activity was Quiet (Kp 0-2).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remained at background.

Four-Day Space Weather Forecast Summary

Solar Activity: Low to Moderate activity is expected, with a chance of isolated Moderate-class flares.

Solar Wind / Geomagnetic Activity: The partial halo CME which was observed following the Moderate-flare off the southeast quadrant has been analysed. Results suggest a possible glancing blow on Day 3 (25 Sep), probably associated with the 'shock' as the bulk of the material

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appears to be heading to the south and east of Earth's orbit. However, this is considered low confidence.

Slow wind conditions are expected to persist days 1-2 (23-24 Sep) before the onset of any faster wind from a coronal hole, most likely day 3 (Sep 25), which could possibly coincide with the glancing CME. Solar winds are likely to become elevated, only gradually easing late day 4 (Sep 26). Mainly Quiet (Kp 0-2) geomagnetic activity at first with a chance of isolated Unsettled (Kp 3) intervals. The onset of coronal hole fast wind will then bring a likelihood of Active to G1/Minor Geomagnetic Storm intervals, perhaps later day 2 (24 Sep), but most likely day 3 (25 Sep). If the coronal hole fast wind coincides with the glancing blow CME, geomagnetic activity could be more enhanced, although this is considered to be low confidence. Otherwise, activity easing to Quiet to Unsettled, with Active intervals on day 4 (26 Sep).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is forecast to be at background with no Solar Radiation Storms occurring.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	20	60	5
Strong	G3	No	1	1	5	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	50	50	50	50
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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